

Exposing carboxyl polymer-polyepoxide powder to amine for powder coating

Description of Technology: The present invention relates to the use of ammonia and organic amines as catalysts in epoxy hybrid powder coatings.

Patent Listing:

1. **US Patent No. 6,713,560**, Issued on March 30, 2004, “Exposing carboxyl polymer-polyepoxide powder to amine for powder coating”

<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetacgi%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=6,713,560.PN.&OS=PN/6,713,560&RS=PN/6,713,560>

Market Potential: Powder coatings are dry polymer powders that are coated onto a substrate and then heated to coalesce the particles and create the final coating. The technical demands on such coatings are significant: the powder must be able to be applied and cured to give a smooth coating which is strong and flexible. The binder resin must possess a rapid cure rate, at as low a temperature as possible, to allow high production throughput and minimum energy expenditure. Additionally, the powder must be non-tacky at temperatures up to 40.degree. C. so that the particles do not clump on prolonged storage before use.

Resin curing is often catalyzed by the addition of quaternary ammonium salt or phosphonium salt catalysts. In order to be effective, these salts must be compatible with the resin and have sufficient mobility in the resin melt to diffuse to and contact the reactive groups of the resin polymer components in order to catalyze the reaction. These catalysts introduce mobile ions into the resin coating that may compromise hydrolytic and electrochemical stability. Moreover, the act of blending the catalyst into the resin composition, typically by melt extrusion, can induce premature curing of the composition. Finally, a significant amount of catalyst by weight is required in the formulation due to the typically high molecular weight of the catalyst.

A significant portion of the powder coatings market is represented by carboxyl-functional polymer-epoxy hybrids, which are combinations of epoxy resins with carboxylic acid-ended oligomers, such as polyester oligomers. The use of quaternary ammonium or amine salts or phosphonium salts as catalysts for polyester-epoxy films is well known. These materials are generally added in either melt-blending or dry compounding before application to the article to be coated. However, generally larger amounts of amine or quaternary ammonium salts must be added to allow for full curing, resulting in excess materials to be used, which subsequently stay in the cured film as a potential impurity.

Benefits:

- Reduces potential impurities that stay in cured film

Applications:

- Resin curing

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